

Know Your Rivers - Salmon and Sea Trout Catchment Summary

River Usk

Introduction

This report describes the status of the salmon and sea trout populations in the Usk catchments. Bringing together data from rod catches, stock assessments and juvenile monitoring, it will describe the factors limiting the populations and set out the challenges faced in the catchment.

Action tables set out habitat improvements to restore freshwater productivity of salmon and sea trout populations. These tables also include some work which will be carried out by our partner organisations, not just Natural Resources Wales (NRW).

NRW has a duty, defined in the Environment (Wales) Act 2016 to have Sustainable Management of Natural Resources (SMNR) at the core of everything that we do. By applying the principles of SMNR in all of our activities - from agriculture, forestry and flood defence to development planning - we are undertaking catchment-wide initiatives that will deliver for fish stock improvements. Our reports highlight the importance of considering the whole catchment when identifying and addressing fisheries issues; and of working with partners.

NRW is committed to reporting on the status of salmon stocks in all of our principal salmon rivers for the Salmon Action Plans and condition assessments under the Habitats Directive in SAC rivers; all fish species in all of our rivers are reported for the Water Framework Directive (WFD). This report will fulfil these commitments and provide an informative and useful summary of stock status and remedial work planned, for our customers, specifically anglers, fishery and land owners; as well as our partners.

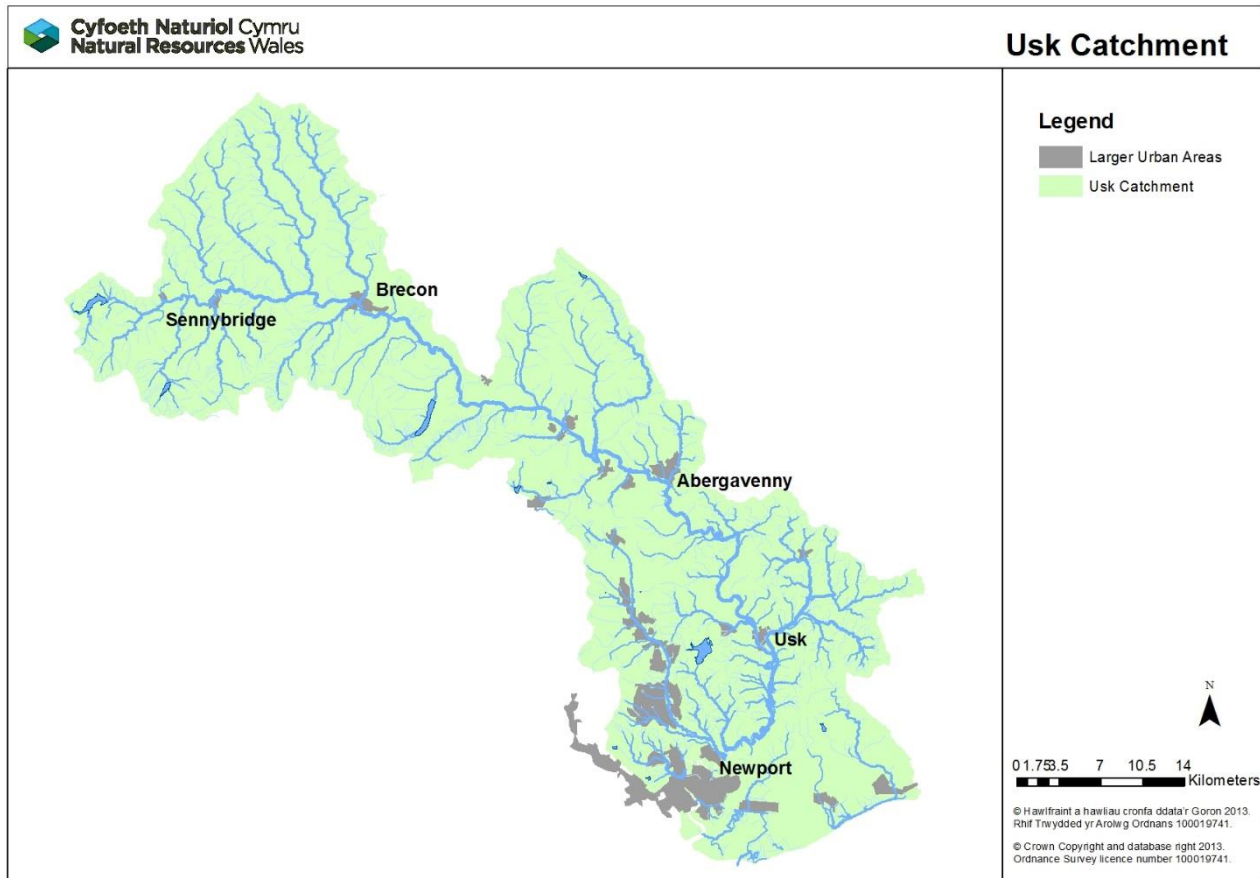
Catchment

The river Usk rises at 530m AOD on Black Mountain in the Brecon Beacons and flows in a south-easterly direction for about 125km to the Severn Estuary at Newport. The catchment is long and narrow with typically short steep tributaries, and drains an area of about 1160 km². The catchment is largely rural in nature, being dominated by the Brecon Beacons National Park, and sparsely populated, the exceptions being Newport, Abergavenny and Brecon.

There are four reservoirs in the upper Usk catchment; the Usk, Grwyne Fawr, Talybont (on the Caerfanell) and the Crai, and a further reservoir (Llandegfedd) lower down in the catchment on the Sor Brook.

The Usk estuary at Newport is linked to an extensive area of reclaimed coastal grasslands and network of drainage channels, the Gwent Levels. These Levels are controlled by tidal flaps, sluices and weirs but are known to hold some populations of coarse fish and eels.

The Monmouthshire – Brecon canal connects Newport and Brecon with a short side branch to the Ebbw valley. The canal relies on the abstraction of water from the Usk at Brecon, just upstream of the weir, and is topped up by additional abstractions from tributaries of the Usk, the largest of which is on the Crawnon.



The river Usk and its major tributaries are designated a riverine SAC under the Habitats Directive for a number of rare or threatened nationally and internationally important species. These species include seven fish species - Atlantic salmon; allis and twaite shad; brook, river and sea lamprey; and bullhead.

The only obstruction to salmon migration on the main Usk, a weir at Brecon, was made passable in 2002 by the installation of a Larinier fish pass. A number of obstacles remain on the tributaries of the Usk, both natural e.g. the falls on the Crawnon and manmade, e.g. the weirs on the Gavenny or the dams at the bottom of the 5 reservoirs. These vary as to the degree of severity from fully impassable to partial barriers at certain flows, and work is being carried out by Natural Resources Wales and the Wye and Usk Foundation, to make some of them more easily surmounted by migrating salmon.

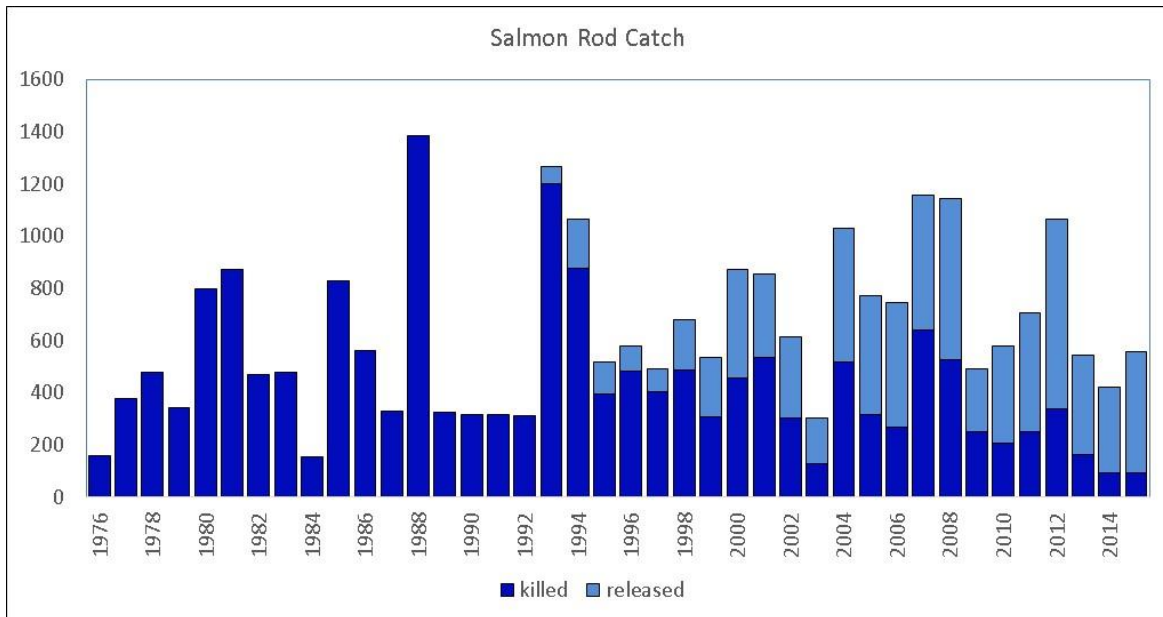
The river Usk is one of the premier salmon rivers in Wales, with its fishery contributing significantly to the local economy. The most recent estimate of rod catch (2015) was 559.

Atlantic salmon are found throughout all of the accessible Usk catchment.

A small amount of sea trout fishing is supported by the Usk, with 2015 reported catches of 80 fish. The river and its tributaries are also an important brown trout fishery.

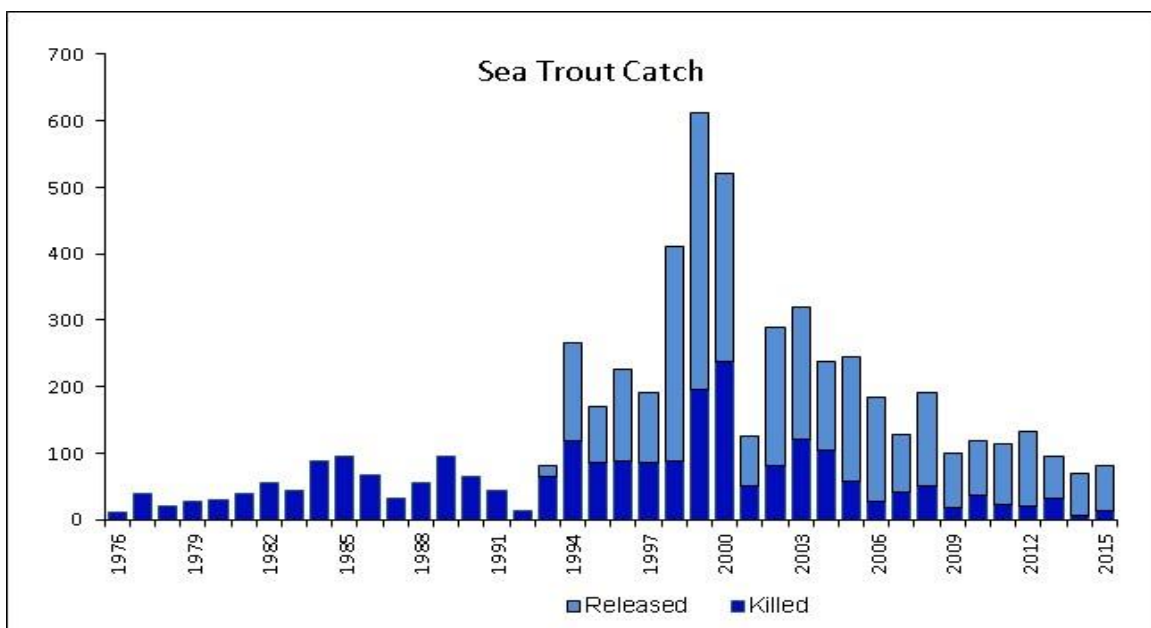
Rod catches

The following graph shows the total declared rod catches, including numbers released or killed for salmon on the Usk, since 1976; catch and release has been reported since 1993. The figures given in this report are declared catches from licence returns.



The rod catch for sea trout in the Usk had traditionally been relatively low, usually less than 100 per year. Catches increased in the late 1990s after the closure of the net fishery, peaking at 611 in 1999. However, this was not sustained and catches have declined steadily since.

Due to the small size of the sea trout fishery on the Usk it is not considered further in this report, focusing only on the salmon stocks.

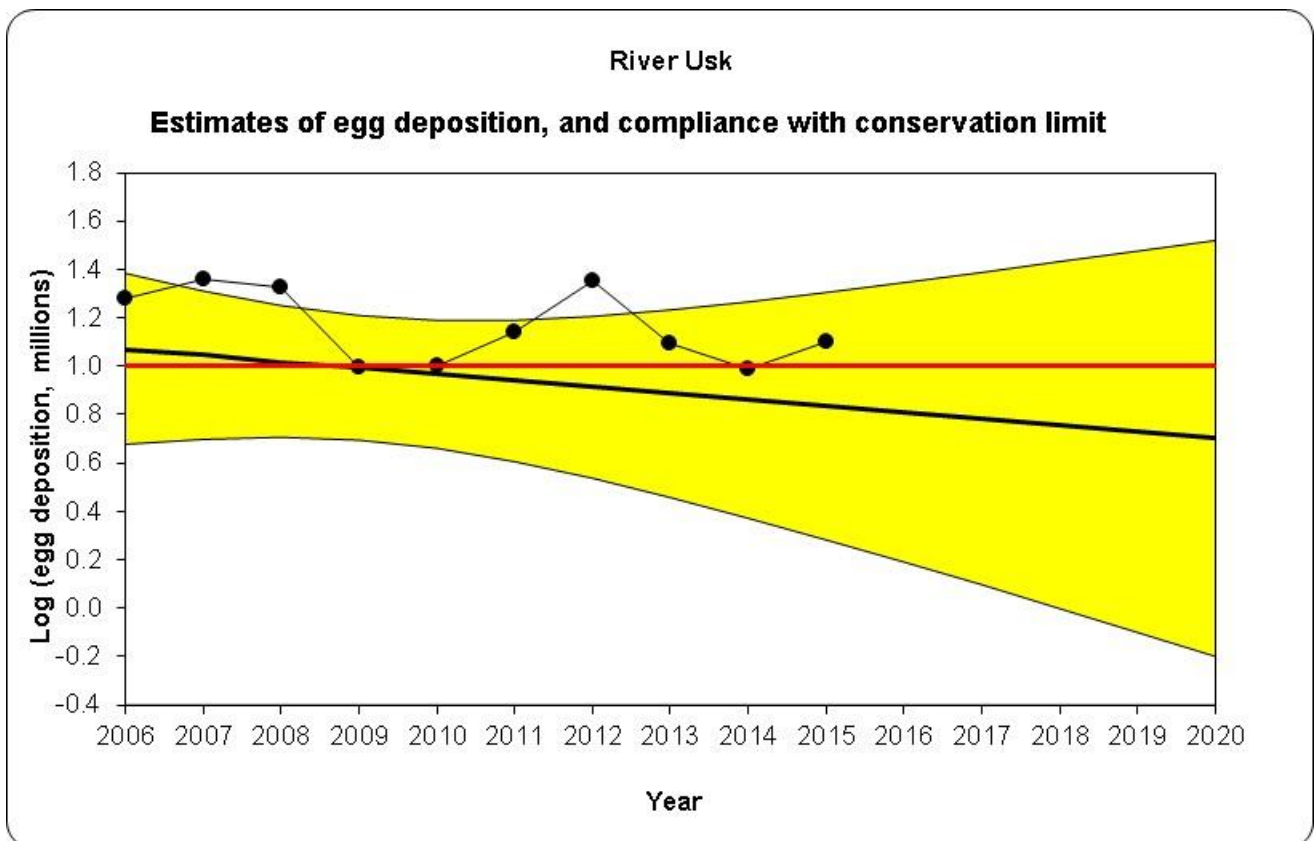


Stock Status

Conservation of Salmon

Salmon stock status is assessed through the use of 'Conservation Limits' (CL) which provide an objective reference point against which to assess the status of salmon stocks in individual rivers. The numbers of salmon a river can produce (and consequently the catches that the stocks support) are a function of the quality and quantity of accessible spawning and rearing area. This is why, in general, big rivers have larger catches and have correspondingly bigger total spawning requirements (or Egg Deposition Targets - EDT) than small rivers. Thus, for any given rivers there should be an optimum level of stock which the CL seeks to protect. The Conservation Limit represents the number of eggs that must be deposited each year within a given catchment in order to conserve salmon stocks in the future.

The Conservation Limit for the Usk is set at 10.11 million eggs, represented by the red line on the graph.



The current estimated number of eggs being deposited (13.7 million) is just above the Conservation Limit. This estimate uses rod catch as a means of estimating returning salmon. 2015 rod catch was not one of the better years and improvements in catch will certainly be needed to ensure future compliance.

Although meeting the Conservation Limit the eggs deposition estimate is lower than would safely meet management targets and therefore the overall picture for the stock is a declining trend; we now class the stock as '**Probably at Risk**' of meeting its target sustainable stock levels. Our statistical predictions also suggest that in 5 years' time, the status of the Usk salmon stock will still be '**Probably at Risk**'.

This statistical approach to assessing stock is heavily reliant upon rod catch as a surrogate for fish abundance. Whilst this approach does have flaws it clearly describes some level of consistency and trend sufficient to describe Usk salmon stock changes.

Future compliance to safe levels, or with positive trends where we would consider the river not at risk of meeting safe stock levels, would need to see annual salmon catches regularly exceeding 1000 fish.

Juvenile Abundance Monitoring

The Usk catchment has a network of sites which are fished either on an annual basis (temporal), or a six year rolling basis (spatial); this programme has been in place since 2006, although is broadly comparable to previous survey programmes

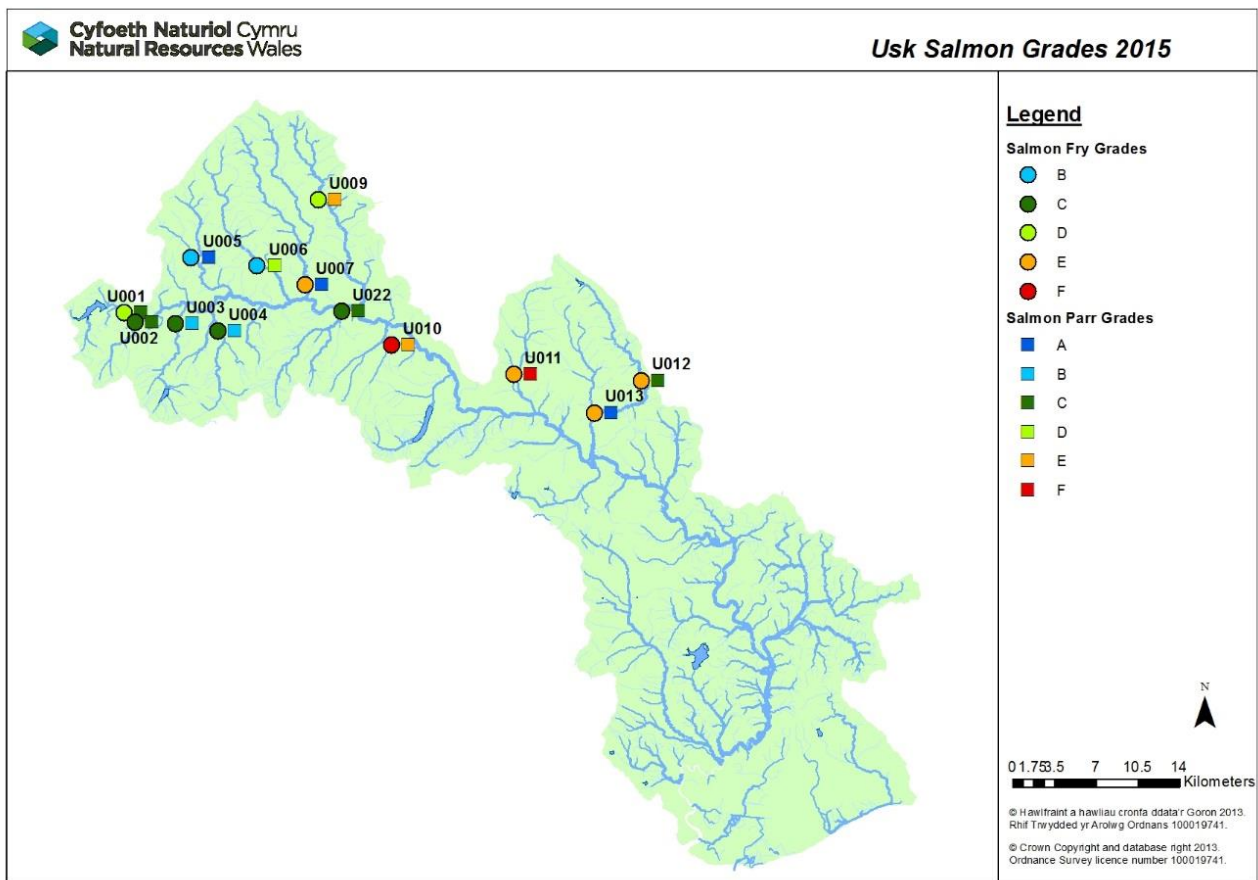
In 2015 a temporal survey programme was undertaken on the Usk catchment, comprising 13 quantitative electric fishing surveys; the following map shows the results. All of the sites were surveyed using a fully quantitative (Q) catch depletion technique between stop nets and with at least 3 runs.

The symbols display the National Fish Classification Scheme (NFCS) grades which have been developed to evaluate and compare the results of fish population surveys in a consistent manner. The NFCS ranks survey data by comparing fish abundance at the survey sites with sites nationally where juvenile salmonids are present. Sites are classified into categories A to F, depending on densities of juvenile salmonids at the site. The following table shows the values and classification of NFCS.

Grade	Descriptor	Interpretation
A	Excellent	In the top 20% for a fishery of this type
B	Good	In the top 40% for a fishery of this type
C	Fair	In the middle 20% for a fishery of this type
D	Fair	In the bottom 40% for a fishery of this type
E	Poor	In the bottom 20% for a fishery of this type
F	Fishless	No fish of this type present

Salmon were present in varying densities at all of the sites surveyed, from Poor (E) overall grades on the Menasgin and Rhiangoll to Excellent (A) on the Cilieni and Ysgir.

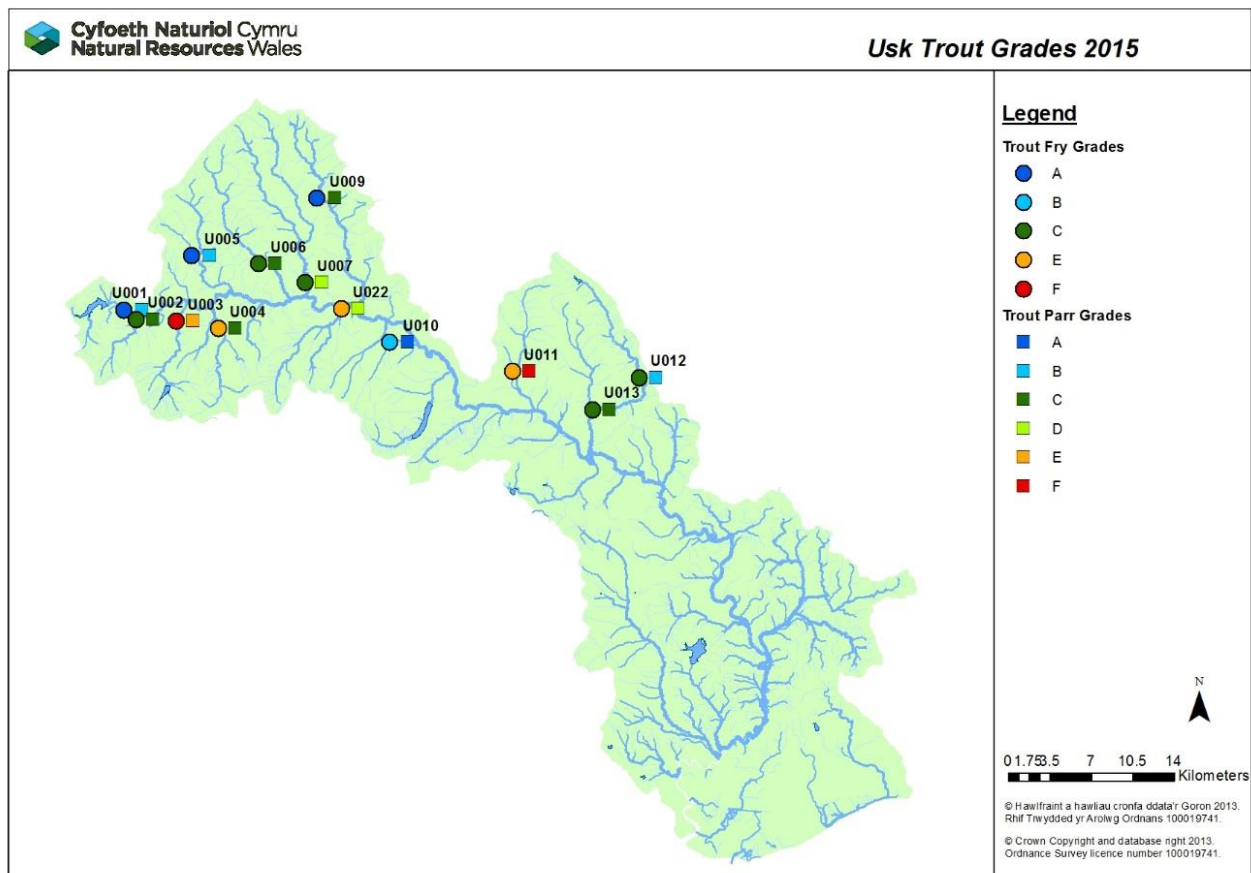
Overall juvenile salmon densities across the catchment were poorer than in the last two years, with a lower average density and fewer sites in the Excellent (A) or Good (B) grades. The average densities of fry and parr are broadly similar to those seen in 2011, and whilst low, are not outside of the usual range. Likewise, at individual sites the variation remains roughly within the usual range.



Usk (U001); Hydfer (U002); Crai (U003); Senni (U004); Cilieni (U005); Bran (U006); Ysgir (U007); Honddu (U009); Menasgin (U010); Rhiangoll (U011); Grwyne Fawr (U012); Grwyne Fechan (U013) and Tarell (U022)

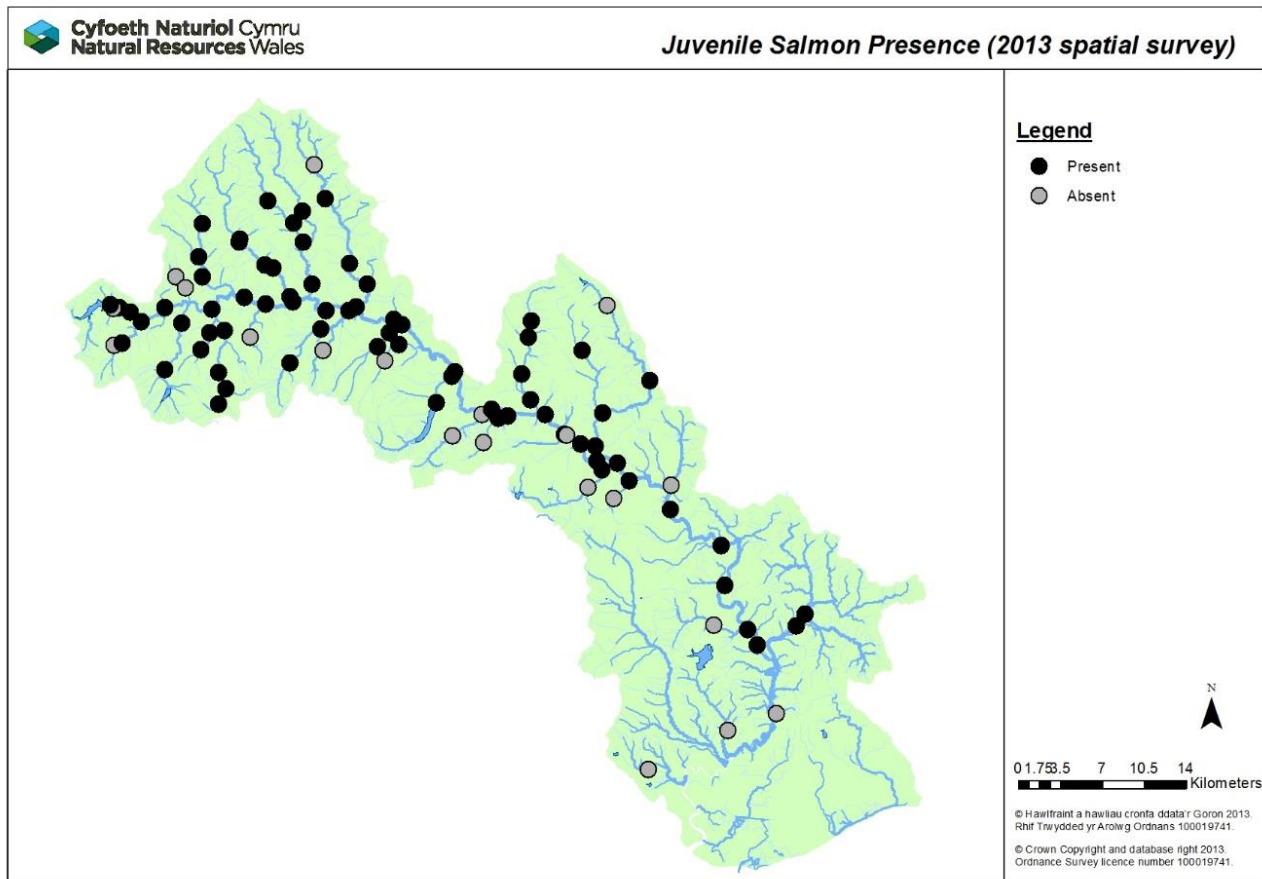
Brown trout were present in varying densities at all of the sites surveyed from Poor (E) overall grades on the Crai, Tarell and Rhiangoll to Excellent (A) on the Cilieni and Honddu.

Overall brown trout densities across the catchment were higher than in the previously two years, although the number of sites in the Excellent (A) or Good (B) grades remains roughly the same. As with the salmon, the average densities of fry and >0+ trout remain well within the usual range.



Usk (U001); Hydfer (U002); Crai (U003); Senni (U004); Cilieni (U005); Bran (U006); Ysgir (U007); Honddu (U009); Menasgin (U010); Rhiangoll (U011); Grwyne Fawr (U012); Grwyne Fechan (U013) and Tarell (U022)

In 2013 a full spatial programme, comprising 92 sites, was undertaken on the Usk. The presence of juvenile salmon from this survey is shown in the map below. As can be seen, juvenile salmon were recorded at most of the sites in the catchment (72/92).



Juvenile Trend Analysis

The data from all quantitative surveys done in the Usk catchment, between 1986 and 2015 were used in this analysis, with the exception of post and pre stocking surveys.

Both salmon and brown trout were analysed using both a linear and non-linear model on the 30 year data set (1986 – 2015), and just the linear model on the 14 year data set (2002 – 2015), the latter representing the period for which the surveys were standardised and undertaken every year. The 14 year data set used data only from surveys conducted annually as part of the temporal Core Fish Monitoring Programme.

The linear model fits a straight line to the data in order to determine whether a trend (upwards or downwards) is present in fish numbers over the timeframe. The statistical significance of the trend is denoted by the P value, $P > 0.975$ indicates a statistically significant upward trend and $P < 0.025$ indicates a statistically significant downwards trend. This can also be considered as percentage chance, e.g. a 97.5% chance of an upward trend, or a 2.5% chance of an upward trend.

The non-linear model fits a curved line to the data, which may be more informative in long data sets of naturally fluctuating fish populations. It can highlight particular times within the data series where upwards or downwards trends have been more evident; however no statistical significance can be calculated for these trends. It is not used for analysing short-term datasets as the effect of abnormal years (e.g. the high flows and inefficient survey conditions of 2007 and 2008) can heavily skew the results.

It is important to remember that these trends will fluctuate year on year, and should be considered as part of a bigger analysis, including for example rod catch and habitat availability.

Salmon

On the face of it, the juvenile salmon populations in the Usk look to have increased since surveying began in 1986 with an overall juvenile upward trend ($P = 0.90$); this upward trend is more evident in fry than in parr, the latter of which show a slightly declining trend.

However when looking at short term data or analysing differently using a non-linear trend, a different picture appears describing a levelling off of juvenile salmon numbers in the late 1990s early 2000s followed by a decline in the last 5 or 6 years (seen in both fry and parr).

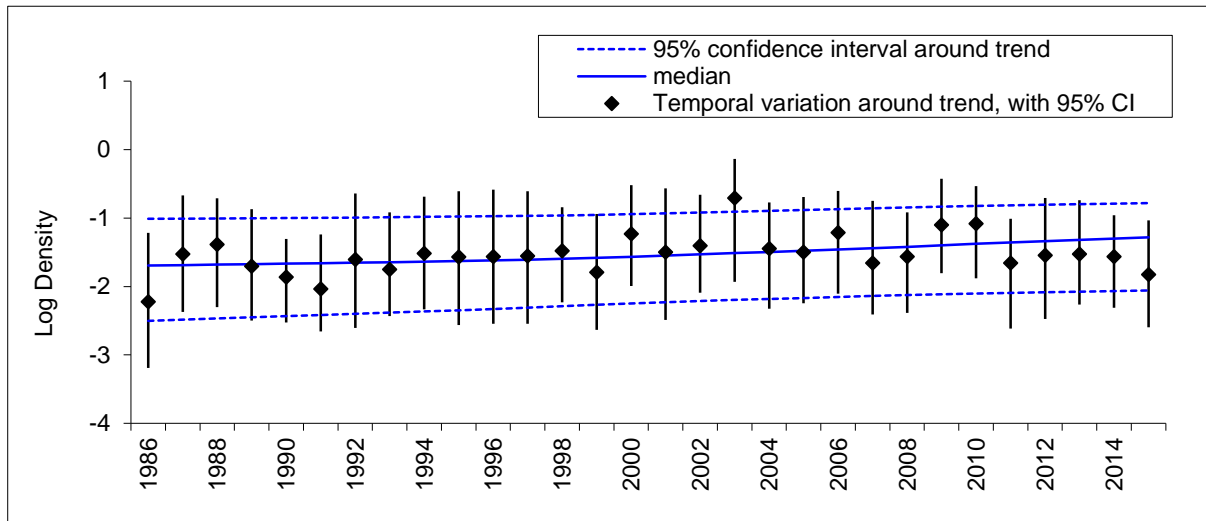
There is much uncertainty associated with these data, two good survey years early on, coupled with poor years in 2008 and 2009 may have skewed this short term dataset. However, we do know that there have been real juvenile salmon declines at one or two sites, notably the Rhiangoll, and work is being done to identify the reason for this.

Brown Trout

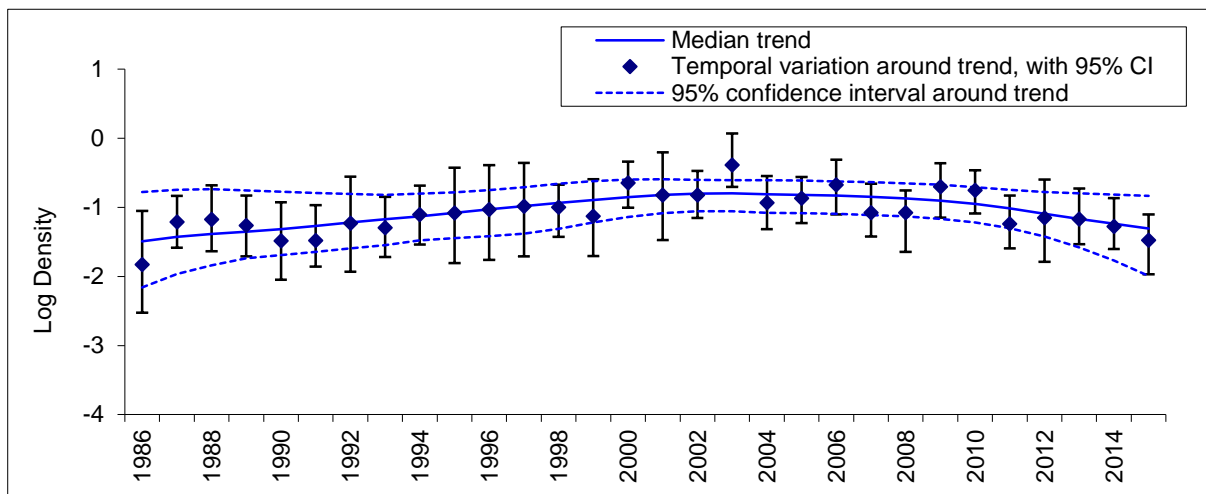
The trend in brown trout populations in the Usk catchment appears to contrast with that of the salmon. The long-term linear analysis suggests a decline over the time period of 1986 to 2015, however, this trend is not statistically significant ($P = 0.29$), and has markedly improved from 'highly statistically significant' just a couple of years ago. The trend in trout fry over this time period is upwards, with the overall decline being driven by a strong downwards trend in parr and adults ($>0+$), although this is no longer statistically significant.

The non-linear analysis suggests a levelling out of this downwards trend in the early part of this century, and possibly an upturn. This is backed up by the short-term dataset, which shows an overall upwards trend ($P = 0.86$), where the trend is now roughly equivalent in fry and parr.

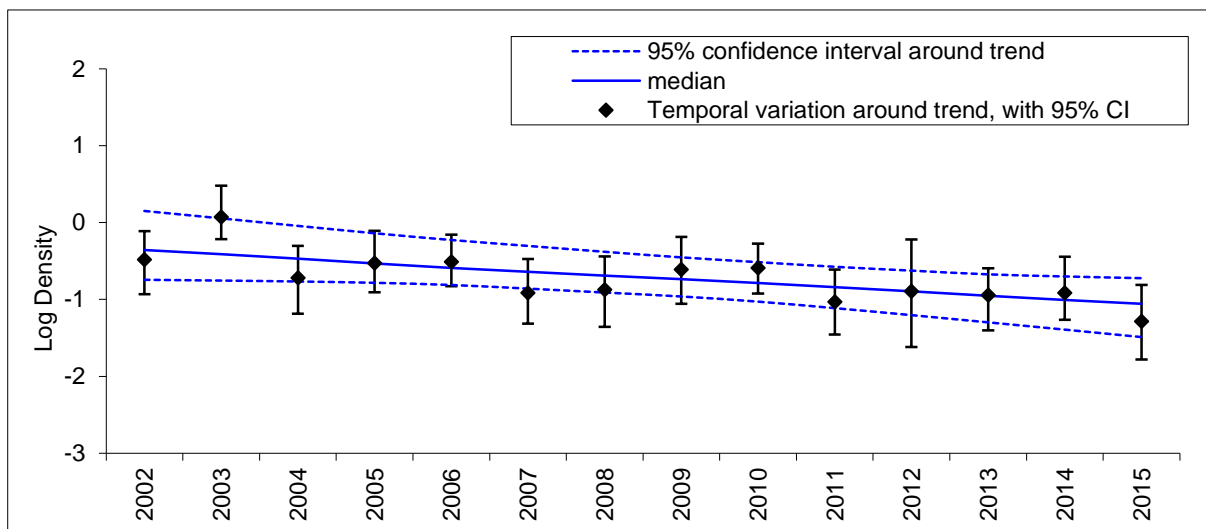
Of note is that in 2013 when the full spatial survey was carried out in the catchment, the Habscore results, suggested that the majority of sites have trout parr and adult numbers well within normal ranges.



Linear analysis of juvenile salmon populations in the Usk catchment, 1986 to 2015 ($P = 0.9002$)

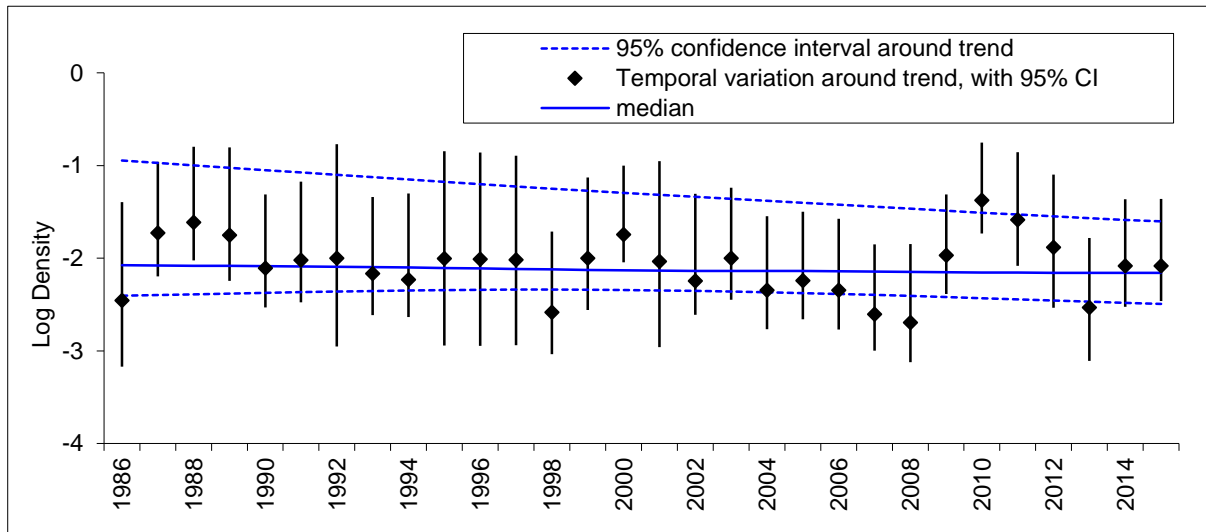


Non-linear analysis of juvenile salmon populations in the Usk catchment, 1986 to 2015

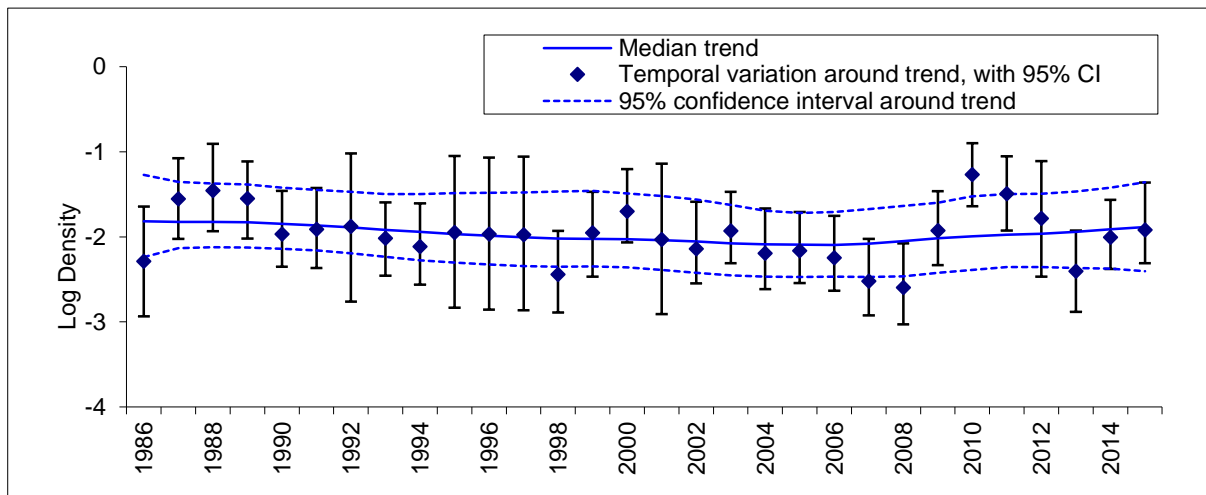


Linear analysis of juvenile salmon populations in the Usk catchment, 2002 to 2015 ($P = 0.00795$)

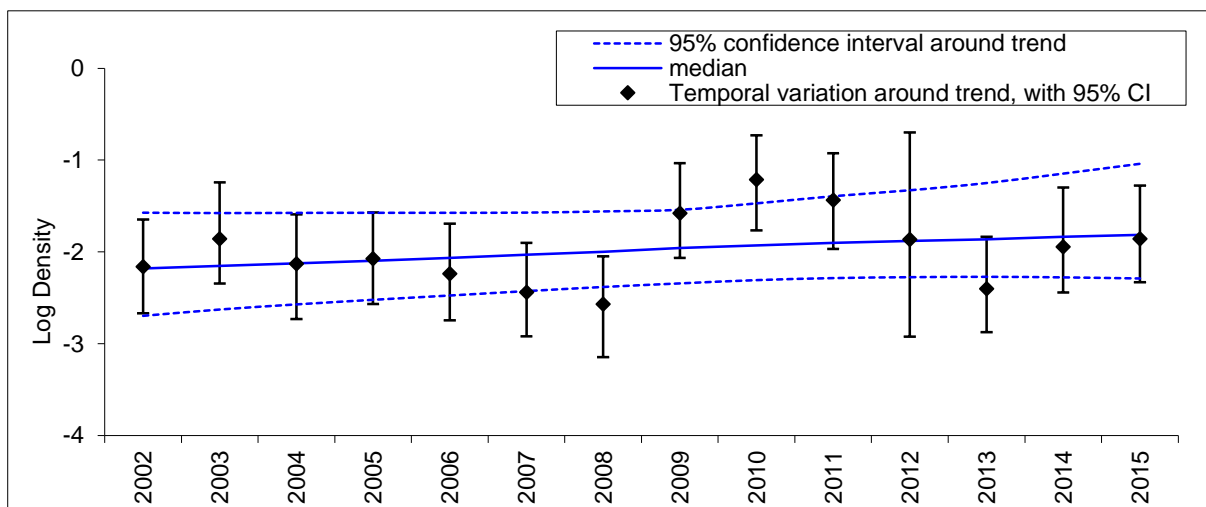
Juvenile Brown Trout Trends



Linear analysis of brown trout populations in the Usk catchment, 1986 to 2015 ($P = 0.2924$)



Non-linear analysis of brown trout population in the Usk catchment, 1986 to 2015



Linear analysis of brown trout populations in the Usk catchment, 2002 to 2015 ($P = 0.8668$)

Fisheries Actions – Usk

Site	Action	Benefits	Lead	Partner(s)	Timescales for delivery
Berthin Brook	Fish easement – options appraisal for removal of old weir remnants (SO 36548 01959)	Migration for salmon and trout improved.	NRW	WUF	2016
Caerfanell	Heavily Modified Waterbody assessment of DCWW impact of abstraction on the migratory barriers in the river. Part of the Restoring Sustainable Abstraction programme.	Enough water in the river to support migration of salmon to spawning grounds below reservoir. Weirs eased as migratory barriers.	NRW	DCWW WUF	Ongoing
Cleisfer	Fish easement – access under canal	More habitat accessible to salmon and trout; increased population size and viability.	NRW	WUF Landowners	Ongoing
Gavenny	Partnership project to address WFD failure. Includes farm liaison, water quality monitoring and sewerage misconnection identification. https://www.facebook.com/gavennyproject?fref=ts https://abercivsoc.com/projects/	Water environment is protected and improved	ACS	NRW WUF FC Landowners	Ongoing
Honddu	Alterations to gauging weir	Migration for salmon and trout maintained and improved.	NRW	WUF	2016
Olway Brook	Delivery of riparian habitat schemes. Agriculture liaison	Reduced siltation in river by livestock exclusion and bank stabilisation. Buy in from riparian owners ensuring continued success of this project.	GWT	Landowners	Ongoing
Menasgin, Rhiangoll, Grwyne & Senni	Rapid fry assessment to determine salmon and trout distribution in catchment, and confirm if there is a problem. Report back to LFG	Increased knowledge, provides basis for work if required.	WUF	NRW	By Sept 2016

Fisheries Actions – Usk

River Usk	Remove grids/bars from Trostrey weir on the river Usk Maintenance work on Brecon Weir	Migration for salmon and trout maintained and improved.	NRW	WUF DCWW	2017 2016
Whole catchment	Agriculture Continue to work with previously engaged farmers in catchment	Reduced loss of soil Reduced loss of phosphate Improved river habitat	WUF	Landowners	ongoing
Whole catchment	Water Framework Directive We will continue to monitor the status of the environment and investigate causes of failures. Refer to Severn River Basin Management Plan for more details https://www.gov.uk/government/publications/severn-river-basin-district-river-basin-management-plan	Water environment protected and improved. More WFD waterbodies achieving Good Ecological Status.	NRW	WUF WT LA DCWW	Ongoing
Whole catchment	Habitats Directive Review of Licenced Abstraction Consents NRW licences water abstractions: Over several years we have been reviewing these licences to ensure they do no harm to the features of the Usk Special Area of Conservation (SAC). Salmon are a feature of the Usk SAC. Many agricultural licences have already been changed. Changes for the remaining water company licences are now being completed.	Enough water will remain in the river to allow salmon and other features of the SAC to thrive.	NRW	DCWW WUF CRT	Licence changes 2016 Compliance by 2018